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MAY 1932

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A. S. T. E. Journal

Published by the American Society of Tool Engineers
8316 Woodward Ave.

Detroit, Michigan

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VOL. I.

MAY 1932

No. 1

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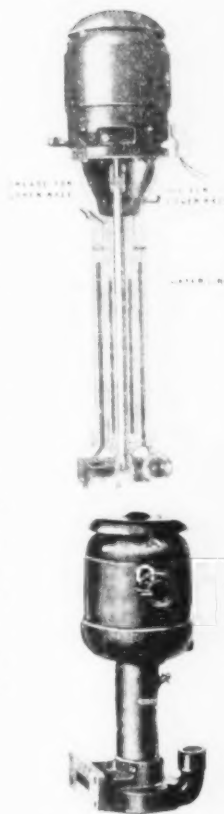
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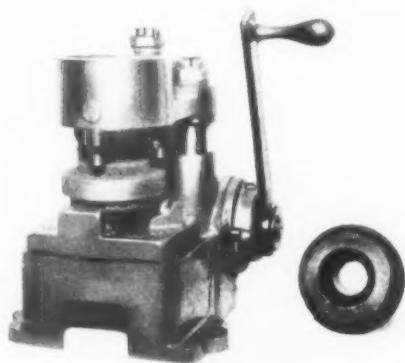
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Officers and Members of American Society of Tool Engineers.

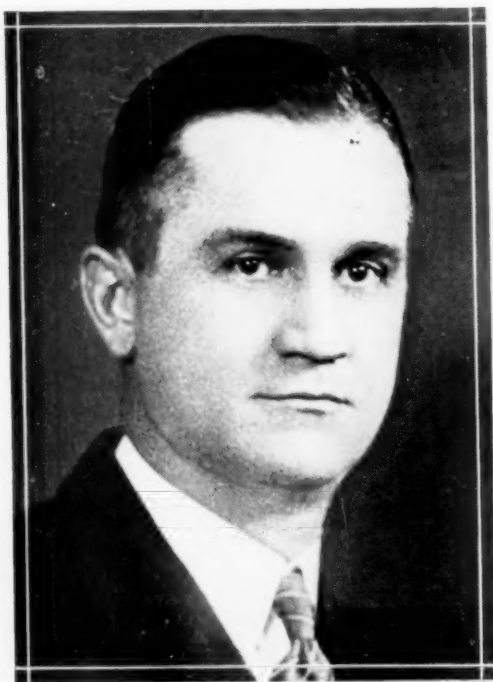
Recognizing the rapid strides already made and realizing the possibilities of the future along your line of endeavor, we believe it will be of interest to all members to know that a new catalog will shortly be issued displaying new and additional lines of Swartz fixtures and fixture locks.

There will be many new features of interest in this catalog, to all tool engineers and designers from the standpoint of new articles as well as new tool engineering displays.

Prices will be very attractive. We shall be glad to register your name for a new catalog.

WRITE US NOW.

OUR PRESIDENT



J. A. SIEGEL

Mr. Siegel requires no introduction to the tool and machinery industries. He has devoted approximately twenty-five years to tool engineering and manufacturing.

Coming to Detroit from Upper Michigan, where he was engaged in the engineering and manufacturing of mining and prospecting machinery, he entered the Packard Motor Car Co., with whom he is at present affiliated.

While holding positions as Tool Designer, Gage Engineer, Tool Standards Engineer, and Asst. Chief Tool and Die Designer at the Packard plant, Mr. Siegel has been a staunch advocate of standardization. He has served on several national committees, one of which is the American Gage Design Committee, formed in 1926, to work out a gage standardizing program sponsored by the U. S. Bureau of Standards. He also served on a committee on "Allowances and Tolerances for Cylindrical Fits and Gages", a work of international scope sponsored by the American Society of Mechanical Engineers.

With his knowledge of the subject, Mr. Siegel is well qualified to direct the new society's standardization work and has already shown very efficient leadership in all activities of the society.

A Message to All A. S. T. E. Members from President Siegel

—♦0♦—

In this initial issue of the society's monthly journal, we are placing ourselves as a body before the public in a conspicuous manner, or if you will, "we are telling the world". The growth of our society has been so phenomenal, considering its short period of existence, that we should like to spread its history to the four corners, but let us not be unmindful of the fact that greatness in number alone will not make a great organization. As our many members were incorporated into one society so also must we incorporate our ideas into activities, and that moulds history.

The possibilities of our society are unlimited, as the field for subject matter and thought is broad, but our accomplishments will be only that proven effort which we can show for the problems we have completed. We must solicit and entertain the co-operation of the manufacturer, both large and small, and our reciprocity will be the lessening of his problems through simplification and standardization.

With a few of these thoughts uppermost in our minds and a true good fellowship spirit prevailing amongst all members, I feel most confident that our activities for this first year will give the society something to "shoot" at next year.

Very sincerely

J. A. SIEGEL.

OTHER OFFICERS

W. H. "Bill" Smila, was born at Weston, Wood County, Ohio, on November 26, 1891. Education—Public School, High School and Mechanical Engineering course at Ohio Northern University at Ada, Ohio.



W. H. SMILA,
First Vice President

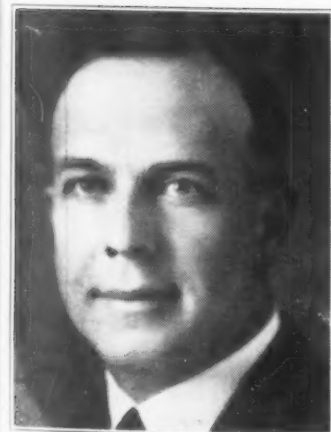
He obtained shop experience at the shops of The Lake Shore Electric Railway Co., at Fremont, Ohio and The Elmore Automobile Co., at Clyde, Ohio.

At the Elmore plant he changed from the shop to the drafting room. His experience includes drafting and designing at the Cleveland-Galion Motor Car Co., and at Wright-Martin Aircraft Corp. of New Brunswick, N. J. At the latter plant he was promoted to the head of the operation layout division and later to Assistant Tool Supervisor.

Since the war he has been Chief Tool Designer at the H. L. & W. Sales and Manufacturing Co. and the United States Rubber Co., Detroit plant.

He next joined the Chrysler organization, Jefferson Ave. Plant, as a tool designer, was promoted to Asst. Tool Engineer, and then to Tool Engineer, the position he now holds.

William J. Fors was born in Muskegon, Mich., May 24, 1891.



WILLIAM J. FORS
Treasurer

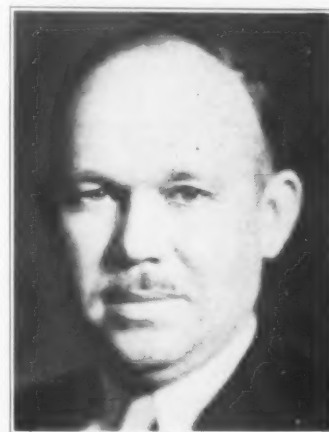
He served a four year apprenticeship as a machinist and tool maker at the Shaw Electric Crane Works at Muskegon. After three years more of tool and die making at various places he began tool designing. He worked at the Cadillac Motor Car Co. six years and became Assistant Chief Draftsman and Tool Engineer.

His experience includes work as Tool and Sales Engineer at the Imperial Bearing Co.; Production Manager at the Hoover

Steel Ball Co. (bearing division) Ann Arbor, Mich. and Tool and Sales Engineer for Leland-Gifford Co.

The Stenger Die and Tool Co. now profit from his experience by employing him as Tool and Sales Engineer.

Earl J. Ruggles was born May 6, 1896 at Grand Rapids, Mich. Education—Grand Rapids grade and high schools.



EARL J. RUGGLES,
Second Vice President

He came to Detroit in 1916 and started as a tool designer at the Cadillac Motor Car Co. His desire for experience led him into many different places of employment where he obtained the broad general experience which he sought.

This experience includes tool and machine design, plant layout, time study, chassis and motor engineering layout and body engineering.

The Gemmer Manufacturing Co. is now profiting by his broad experience by employing him as Chief Tool Engineer.

Albert "Al" Marden Sargent was born at Gilmanton, Belnap County, New Hampshire, September 16, 1898. Education—Public and High School and Mechanical and Electrical course at The Morrell School of Mechanic Arts, Concord, N. H.



ALBERT M. SARGENT
Secretary

His experience includes foreman at Cushman Electric Co., Concord, N. H.; tool and die maker and designer at the Scott & Williams Knitting Machine Co., Laconia, N. H.; tool maker and foreman of the grinding department at Durgin Silver Co., Concord, N. H.; experimental and tool trouble work at the United States Cartridge Co., Lowell, Mass.

He came to Detroit in 1919 and has worked as tool maker and tool designer at the Studebaker Corp.; Chief Engineer at

Universal Wrench Co.; foreman of the brass division at Lincoln Motor Co.; Asst. Supt. of the experimental department at Chevrolet Motor Co.; plant engineer at C. G. Spring and Bumper Co., and Detroit seamless Steel Tubes and Vice President in charge of engineering at Q. C. Engineering and Tool Sales Co.

In March, 1931 he organized the Pioneer Engineering and Manufacturing Co. "Al" is President and General Manager of this Company.

The American Society of Tool Engineers --- It's Origin

By C. B. Jones, President, Detroit College of Applied Science

The sun shines on a pond of muddy water and converts it into a fleecy cloud. The cloud is cooled and descends as refreshing rain to cause a parched seed to sprout and a sturdy tree to grow. The laws of nature can not be set aside. They are irrepressible.

The affairs of men are governed by laws equally irrevocable. Given a certain chain of events or a certain set of conditions, and the result is unalterable. The formation of an enduring state or society can not be effected merely because some individual desires it. Trade booms and consequent depressions do not periodically envelop a state or nation, just because some individual happens to conceive the monstrous idea that the time of visitation of a blessing or a curse has arrived.

The formation of the American Society of Tool Engineers was just as inevitable as the formation of the American colonies into a self governing body. In both cases a certain chain of events resulted in a condition which stagnated growth. In the case of the colonies, high taxes and no voice in the government brought about an intolerable situation. In the case of the tool engineers, the lack of a central body coordinating the actions of scattered individuals and groups, resulted in duplication of effort which was wasteful and contrary to the very religion of a tool engineer, which may be summed up in the one word "efficiency".

No individual man, or isolated group of men, could have formed either organization without the spirit of unrest existing in the hearts of all parties concerned. The desire in both cases was common to all parties forming the group. Had there been no set of conditions creating the need for the individuals to organize, concerted action would not have resulted.

Every tool engineer has, for years, felt the need of cooperating with others in his profession. He has recognized the fact that, in reality, tool engineering can not be called a profession unless, or until, the facts pertaining to it are better organized and standardized than they are at present. He has realized that he could not progress as rapidly as he should, because of his inability to get from books essential facts pertaining to his line of work. Books have not been written by experienced tool engineers who appreciate his needs. Trade journals more nearly meet his requirements, but there are none written exclusively for

him. The obvious result is that he must skim over the entire list in order to find the few articles of value.

The tool engineer is not a conceited individual. It is a fact well known to psychologists that his is the subjective type of mind which recognizes its deficiencies and strives constantly to become better informed. The job of producing a manufactured article for highly competitive markets, when the very existence of his company depends upon the employing of the latest manufacturing methods and adapting them to the equipment at hand, is one that requires a man who is unusually diligent in his efforts to constantly be abreast of the times.

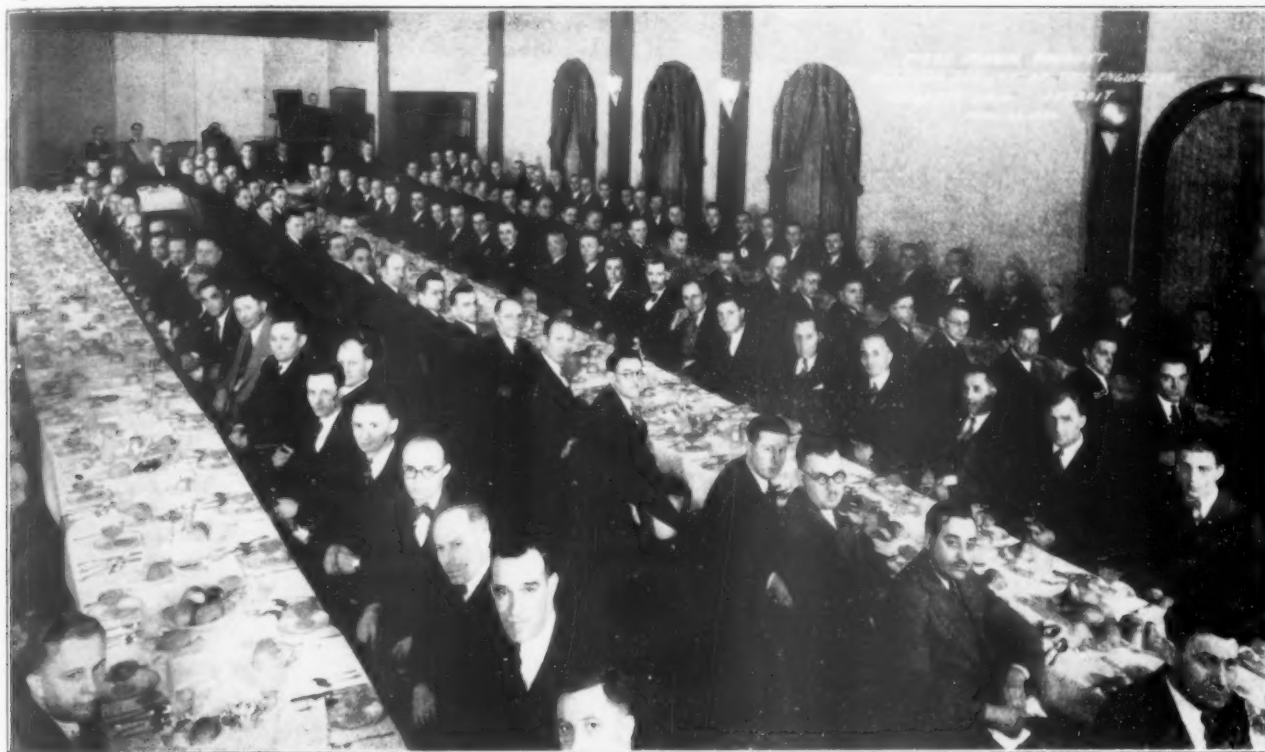


He is aware of the fact that elaborate manufacturing systems have been developed in various industries for synchronizing the efforts of millions of men and miles

and miles of machinery producing automobiles, watches, radios, and every other conceivable article in mass quantities to satisfy the needs and whims of men and women everywhere. He recognizes the indisputable fact that it is not possible for him to go ahead successfully, rendering efficient service to his company and its customers, without an accurate knowledge of all latest developments. He knows that he can not rely upon his own experience only. He is wise enough to profit by the experience of others. He is willing and anxious to do his part in every way to make it possible for him to do this.

The obvious thing has happened. The surprising thing to some is that it did not come to pass sooner. The explanation is, possibly, that the thoughts of tool engineers have been so deeply engrossed in the infinite variety of details incident to the carrying out of their projects that they have not had sufficient time to perfect an organization. The recent cancellation of many projects has given them the opportunity to get a better perspective of the situation and to organize a society which will enable them to do better work in the future with less effort and more assurance of its successful outcome.

In the latter part of the winter just past, the writer, who has been associated with tool engineers for several years and who organized a college for recruits for the profession, called six men, experienced in this line and asked them if they



FIRST ANNUAL BANQUET OF AMERICAN SOCIETY OF TOOL ENGINEERS

would meet him at his office to discuss the formation of a tool engineering society. Every man of them gave his enthusiastic consent and has worked diligently to perfect the organization. Incidentally, none of these original founders of the society, who met at this first meeting, are listed amongst its officers. Each worked unselfishly and has set aside any desire for self advertising, thinking only of the successful outcome of the organization. This spirit seems to have characterized the actions of all members to date. Such unselfish devotion to the cause makes its success assured.

A few additional tool engineers were invited to attend each of several subsequent meetings where plans for the organization were carefully worked out. At last, on Thursday evening March 3rd, thirty-three carefully selected tool engineers with broad experience, constituting a cross section of the local manufacturing industry, were assembled for the purpose of electing five of their number as officers. The list of these officers is published elsewhere in this journal.

Twenty days later, on the evening of March 23rd, the first general meeting was held at Webster Hall, in Detroit. At this time the membership consisted of approximately 200 senior and

junior members. A picture of this group is shown.

The membership is increasing by leaps and bounds and is gradually covering the manufacturing centers of the nation. Requests have been received from other states for information relative to the formation of affiliated chapters. A committee has been appointed to cooperate with these scattered groups of tool engineers in perfecting the framework of their chapters.

A great deal of painstaking, hard work has been done to date. The results have been phenomenal and very gratifying. Evidently, the conditions, as well as the time, were such that careful planning insured the formation of an enduring society.

Thus it came to pass that unto you was born, in the city of Detroit, in the spring of the year Nineteen Hundred and Thirty-two, a society, which by the grace of God and the unstinted efforts of its members, may be an everlasting monument to the profession of Tool Engineering, an ever increasing boon to manufacturers and a blessing to the millions they serve the world over.

Waiter (observing diner's dissatisfaction): "Wasn't your egg cooked long enough, sir?"

Diner: "Yes, but it wasn't cooked soon enough."

EDITORIAL PAGE

The first issue of this journal denotes the initial public gesture of a movement, the institution of which, opens such unbounded possibilities, as to tax even the most fertile imagination. This movement is the organization of the American Society of Tool Engineers.

The need and value of such a movement is evident by the enthusiasm with which it has been received by the mechanical publications, the engineering fraternity, and the manufacturers, who will reap untold benefits from the attainments of this organization.

The efforts and achievements of the American Society of Tool Engineers, will of course, find expression in this publication and it is the aim of the publishing committee to elevate the standard of this publication to a degree surpassed by none.

This goal can only be achieved by the cooperation of the various branches of endeavor which coordinate to plan, design, and make tools and equipment for mass production.

To accomplish something really outstanding we depend on the vast storehouse of knowledge of the men, we are proud to say, we have with us in the organization. We also look forward to outside aid from the research and engineering departments of the manufacturers of America in compiling the data which we will collect and publish for the benefit of all interested in the improvement and standardization of manufacturing methods, which is the real reason and purpose of this organization.

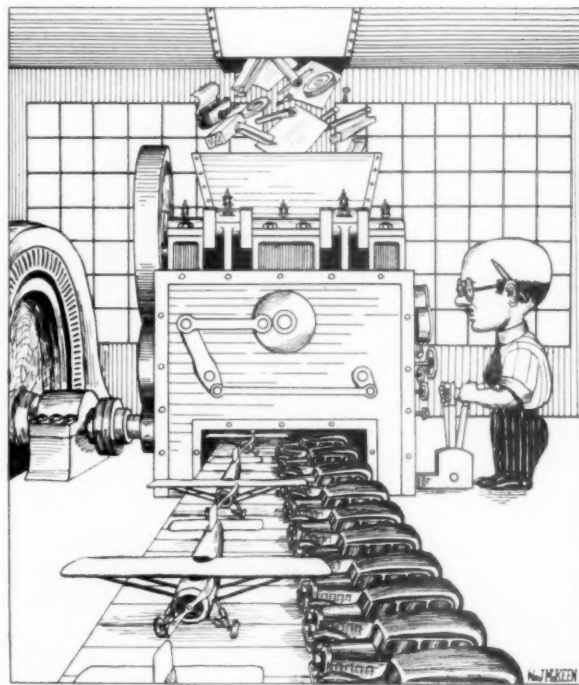
ED. A. RUTT.

The Tool Engineer

By One of Us.

The process of organizing the American Society of Tool Engineers brought up the question, "What is a tool Engineer?"

The men from the various factories who organized this society, had to ask themselves the question, "Am I a tool engineer?" and found that there was no yard stick to measure with, and had to define the words in order to measure themselves. The qualifications for membership in the society are probably the first real attempt to definite a tool engineer, although the name has come into use quite extensively during recent years, particularly in this section.



THE TOOL ENGINEER

The title "Engineer" has several definitions. We recall that as a boy, our ambition was to be an engineer—one of those fellows who runs a threshing machine engine. Later, we got more ambitious and hooked our wagon to a star—we wanted to be a locomotive engineer.

The development of tool engineering seems to have enabled us to realize our boyhood ambition to be an engineer, although not at all as we visualized such a state.

A tool engineer apparently has something to do with tools. One definition of a tool is anything in the way of an instrument or apparatus necessary to the prosecution of one's trade or profession. In the industry, there are machine tools, hand tools, perishable tools, semi-perishable tools, etc., and a tool engineer is one with knowledge and ability to originate, produce, plan operations or specify the use of tools.

A tool engineer is a man of many different titles due to the recent development of his trade. His title may be Master Mechanic, Tool Supervisor, Tool Designer, Supt. of Tools, or what have you, but his work and ability is to originate, produce, plan operations, or specify the use of an instrument or apparatus used in production.

(Continued on page 19)

REPORT OF APRIL MEETING

The April meeting was held April 14, at Webster Hall, Detroit. Dinner was served at 7:00 o'clock, music and entertainment being furnished.

The meeting was called to order by Mr. Joe Seigel, who introduced Mr. Walter Emig, Works Manager of the Ralston Scale Corporation of Columbus, Ohio. Mr. Emig discussed goodfellowship as being necessary for success in forming a Society such as ours, sighting his experience as Past-President of the National Forman's Club.

Committee reports followed.

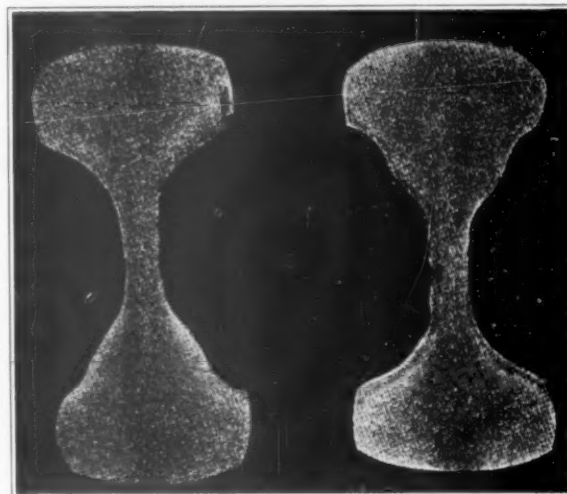
The principle speaker was Mr. L. A. Danse, Chief Metallurgist of Cadillac Motor Car Company, who gave an interesting address on preparing and forging steel for connecting rods. A three reel motion picture of the topic was shown. Mr. Danse described steel by comparing it with water. Water can be changed from the liquid state to the solid or gaseous state by the applying or removing of heat. This change occurs at certain temperatures, except when other substances are added such as salt, and so on. In like manner steel can be changed from the solid to the liquid or gaseous state by the application of heat. The adding of other substances as chromium and molybdenum affects the point of change. A difference lies in the fact that the application of heat can change the nature of steel.

The following is a condensed article by the author describing the entire process of manufacturing the rods, including their heat treatment and the special measuring instruments used to test the quality and accuracy of the work at the Canton Drop Forging & Mfg. Co.

"Unusual precautions taken by automotive engineers to insure exacting performance have imposed severe burdens upon the metallurgical industry. To the increased physical properties and resistance to service stresses of materials generally and to the improvement of alloys, the automotive industry has contributed materially. Better steel, better forging, better heat treating—constant progress is the rule.

In the high state of development which of late has been achieved, no part better exemplifies recent advances in steel, forging and heat treating than the connecting rod used by the Cadillac Motor Car Co., Detroit. Subject, as it is, to great stresses at the high speeds at which Cadillac and La Salle cars ordinarily are driven, the rod is not

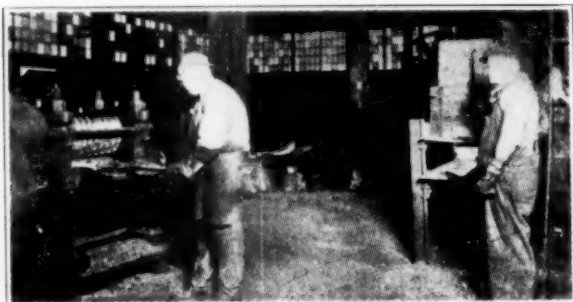
made of the general run of materials or fabricated by commonly accepted methods. To insure long life, high physical properties were necessary. These were investigated not only by static tensile, bend and compression tests, but also by special fatigue testing machines which proved that the design, material and treatment would result in a high "fatigue limit." One of these machines is of the Upton-Lewis type, built to handle the connecting rod shank itself instead of a test specimen cut out of the rod and therefore representative only of the material and not of the structure. By the use of the rod shank itself, the entire structure is tested—the design of the rod, the design of the rod, the material of which it is made, the method of forging and the heat treatment.



After considerable work has been done on a program of fatigue testing in Upton-Lewis machines, it was discovered that although the material chosen was excellent, the design an advanced type, and the heat treatment precise and suitable for the material, the old method of forging caused inherent weaknesses which could not be compensated for by any practicable means. Therefore, an investigation was started to improve upon the then current methods of forging. Careful analysis revealed that common forging practice involved a "roughing-out" method of breaking down the shank of the rod, thus causing crooked, wavy flow lines in the finished forging. This was brought out by macro-etching the forgings in a strong acid solution which attacked the surfaces and threw the flow lines into relief.

Even flow lines constituted the goal to be

achieved and experiments were begun in the forge shop of the Canton Drop Forging & Mfg. Co., Canton, Ohio. After numerous methods of breaking down the shank section were tried, rolling was selected as offering the greatest possibilities and the "interrupted," "push-back", or gun-barrel tapering" type of roll was decided on.



Months of labor and thought and thousands of dollars were spent in developing roll designs to accomplish the desired results.

Even Flow Lines Achieved.

As finally evolved, the rolls comprise nine passes or impressions, each one of which reduces the heated blank in cross-section and elongates it. These successive operations work the material gently and evenly. The resultant rolled blank, ready for forging, is shown in an accompanying photograph.

The old method of reducing the cross-section of the shank between fullers caused breaks, waves and twists which previously had been so troublesome. The new method of gently squeezing the metal down in rolls resulted in straight, even flow lines. At the same time, it was decided that the size and weight tolerances on the rod should be cut down to a degree not before approached in automotive practice, so as to contribute to smoother operation of the finished engine. This introduced new problems. By close cooperation, Cadillac and Canton Drop Forging engineers found a solution in a short time, as the rolling break-down was so uniform that the volume of metal in the finished rolled blank could be controlled with great accuracy. Thus, by elimination of excess flash and the work of extruding it in the dies, the sizing of the finished forging was facilitated and the finish forging operation speeded up.

Minimum Flash and Higher Fatigue Life Attained.

The final line-up gave minimum flash and still

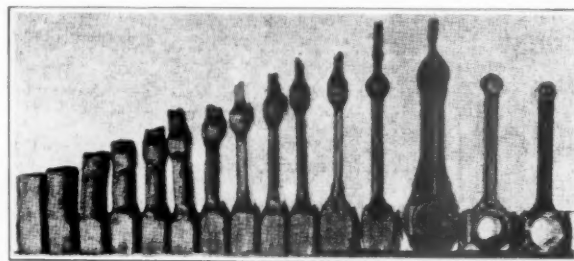
higher physical properties in fatigue, due to elimination of excess flash and its accompanying "squirt" from the web out through the flanges into the flash. Wide flash on forgings precludes any possibility of the finished part having high fatigue life. The weakening of the structure by the shearing action of the "squirt" is the cause. Incidentally, it was found that restriking in a press "set" the material and held shape and size better than restriking in a hammer.

Rods are thoroughly inspected. The thickness of the piston-pin and crank ends is checked with "go" and "no go" snap gages; a special thickness gage is used for the web of the shank and a snap gage for the across-flanges dimension. There likewise is a rear, length and contour gage. Quick-acting dial calipers and a snap gage are employed to test the flange width; a number of rod shanks which have been sawed out in a jig check accurately the weights of the shanks.

The sequence of forging operations is: shear to billet length, heat in pyrometer-controlled continuous furnace, roll (nine passes), reheat in pyrometer-controlled reheat furnace, flatten end (one blow), edge (five or six blows), finish forge (five to seven blows), trim, restrike, pickle and inspect.

Heat Treatment After Forging.

When received from the forge shop, rods are heat treated in a special single-purpose furnace, being hung in slotted conveyor plates which carry them into and through the furnace. At the far end of the furnace, rods are stripped from the slots in the conveyor plates and fall into the quenching oil tank under the furnace. They move up out of the oil on an apron conveyor and drop



on the conveyor of the tempering furnace. After passing through the tempering furnace, the rods fall into a hot water quenching tank from which they are removed on another apron conveyor finally dropping into tote pans ready to be pickled.

The heating curve followed in the heating for quenching is an ideal curve and was developed

experimentally by adjustment of electric heating elements and controls so as to give the optimum of heating conditions. Brinell tolerance on finish heat-treated rods is 255 to 293. After tempering, the rods are pickled to remove heat-treating scale.

No Kinks Straightened Cold

Pickled rods are cleaned by sand blasting, and then inspected for straightness. No straightening of kinks is done and no bends over 2 deg. are straightened cold; if a kinked rod or one bent over 2 deg. is found, it is annealed, straightened and heat treated a second time. Experience has proved that straightening of badly bent parts is fatal to satisfactory performance or life in the engine.

After a spot for the Brinell impression is ground, rods are Brinell tested. In addition, an occasional rod is taken to the laboratory and subjected to an Upton-Lewis fatigue test, as a check on all the production steps. Occasional rods also are macro-etched, as a check on the forging operations.

The material used for the rod is S. A. E. 4140 electric furnace steel which is purchased to rigid requirements for cleanliness and uniformity. Before a heat is released for rolling, in the steel mill, samples of the blooms are sent to the laboratory and polished and examined, unetched, for cleanliness. The number, size, arrangement and kind of inclusions and occlusions are closely prescribed. Cadillac originated this method of inspection.

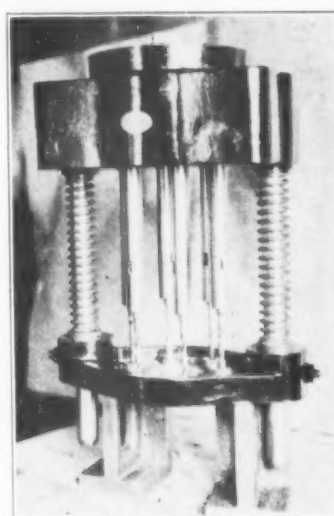
After all these precautions, the finished connecting rod has its edges polished smooth along the area of highest stress to afford no chance of an inequality thereon being a nucleus for failure. Not only is the material under close metallurgical control, but also the design of the rod, and that of the connecting rod bolt, has been carried out along lines which are primarily metallurgical and which depart radically from precedent. The contours of the parts of the structure were dictated solely by the most advanced metallurgical principles and the results have vindicated the choice. Truly, a strong chain. No link left unscanned and no weakness permitted."

This article is reprinted through the courtesy of the "Iron Age".

"Why don't you get out and hustle? Hard work never killed anybody."

"Dat's a lie, suh. Ah's lost foah wives dat way."

CHAIN DRIVE DRILL HEAD



The Ace Tool and Die Co. announces an improvement in the design of multiple drill heads.

Primarily the departure from the so called standard construction, is in the method of transmitting power from the main spindle to the drill spindles. The illustrations show that while to all outward appearances this head follows conventional lines, in reality, its mechanical principle is radically different.

The driving shaft carries three steps of hardened sprockets, and each driven spindle carries one hardened sprocket. Power is transmitted from the driving member through a chain to two of the driven spindles.

Thus the three steps of hardened sprockets, through three separate chains, drive six driven spindles. This construction eliminates idler gears and their bearings, thus reducing friction. An increase in the factor of safety is claimed due to the fact that, whereas in spur gears a small number of teeth carry the load, with this type of drive the chain engages approximately one third of the teeth in a sprocket. This head drives six 25/64 drills at 1200 R. P. M. with chain speed of 700 R. P. M., and while the load per chain is only 47 pounds, the breaking point (manufacturer's rating) is 2900 pounds.



The number of spindles which can be driven in this type of head is limited only by the height of the head, since several sprockets can be mounted on one driving shaft. Additional head height is obtained by the omission of the intermediary plate in which the idler gears of the conventional type of head are mounted.

The oil seal consists of a bronze disc which rotates with the drill spindle and is mounted above, and in contact with, the radial ball bearing of the lower case of the head body. This bronze disc has no oil holes, but allows sufficient oil to reach the bearing through capillary action.

Chain slack, in the case of wide centers, is cared for by introducing, on the slack side of the chain, suitable take-up mechanisms.



CAPT. H. A. WOOFTER,
Chief Engineer,
Swift Electric Welder Co.

NEXT SPEAKER

Capt. H. A. Woofter, the speaker, is a West Virginian by birth and received his higher education at Glenville State Normal School, and West Virginia University, and took advanced engineering work at Lowell Institute, Boston, Mass. While in his 'teens, he enlisted as a volunteer at the outbreak of the Spanish-American War, serving as a Sergeant throughout that hectic war.

He entered the employ of the General Electric Co., in 1906 and took the Electrical Expert Course for two years at Lynn, Mass. He next was employed by the Westinghouse Electric & Manufacturing Co., at East Pittsburg, Penna. for two years. At the end of that time, he returned to the General Electric Co., at Lynn, Mass., as a Transformer Engineer, where he remained until 1918. He resigned to enter the United States Army as Captain of Engineers. After the close of the World War, he entered the employ of the Thomson Electric Welding Co., of Lynn, Mass., as their Electrical Engineer, remaining there until July, 1925, when he resigned to become associated with the Swift Electric Welder Co., of Detroit, Mich., as Vice-President and Chief Engineer. He is Past President of the local Chapter of the American Welding Society; a past

Director of the National body of the American Welding Society, and for two years, has been regional Vice President for the Middle Western District of the American Welding Society. He is a member of many committees, such as the Structural Steel Committee, Building Codes Committee, Marine Boiler Code Committee, Manufacturers Fabricating Committee, National Meetings and Papers Committee.

NEXT MEETING

May 12 - 8:00 P. M.
at Webster Hall, corner Putnam & Cass,
Detroit, Michigan

SPEAKER

Capt. H. A. Woofter,
Vice President & Chief Engineer,
Swift Electric Welder Co.

SUBJECT

RESISTANCE WELDING

Illustrated by lantern slides and specimens
of welding.

Other speakers on subjects of interest to the
Society.

All members are urged to bring guests eligible
for membership.

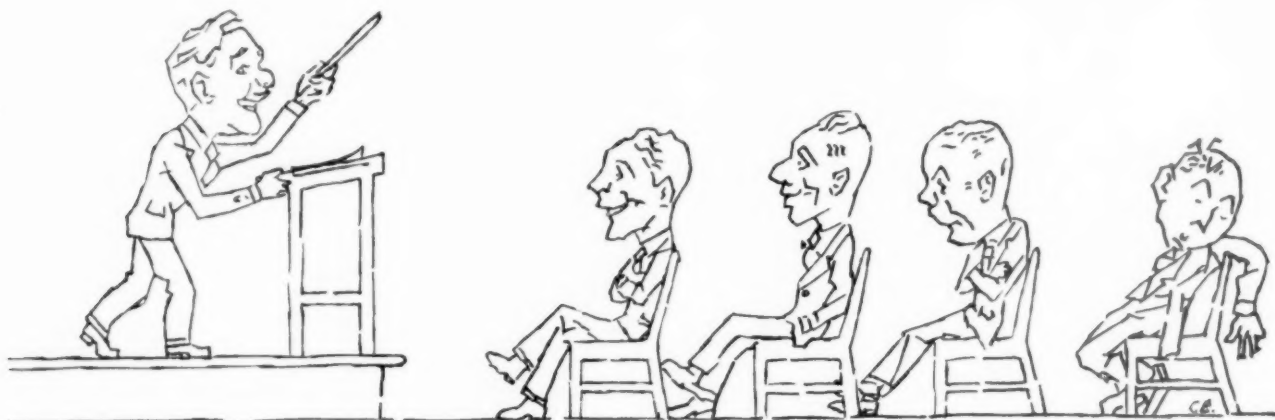
REMEMBER our goal is 1000 members in 1932.

No charge.

MACHINE TOOL BUILDERS POSTPONE EXHIBITION

At their Annual Spring Meeting, the National Machine Tool Builders Association decided to postpone the scheduled Machine Tool Exposition from 1932 to September, 1933.

Present conditions and the fact that the "Century of Progress Exposition" at Chicago, next year, will bring many visitors from abroad, led to the decision; also, 1933 is considered more favorable for other reasons.



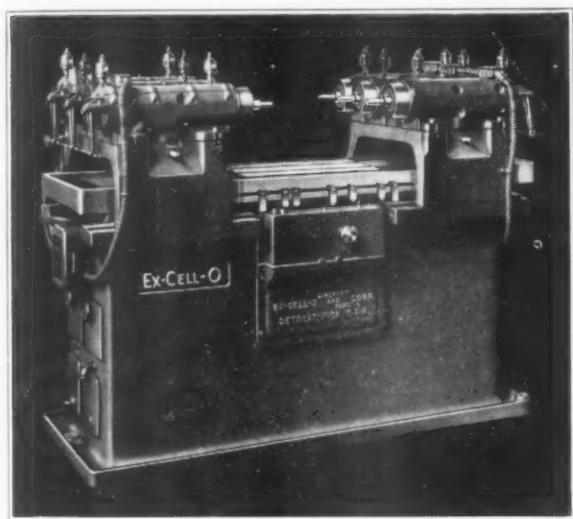
Quiet Operation of Motor Cars Demands Higher Decree of Precision in Boring

THROUGH SUITABLY DESIGNED FIXTURES. LOWER COSTS ARE OBTAINED AND CLOSER MANUFACTURING TOLERANCES MAINTAINED.

By C. A. BIRKEBAK, Diamond Boring Engineer, Ex-Cell-O Aircraft and Tool Corp.

Durability, quiet operation and higher speeds were some of the outstanding requirements faced by the automotive engineers when laying plans for the 1932 motor cars. These problems correspond to similar problems faced in every metal industry today. Accurately finishing holes to sizes with a smooth finish on a production basis are problems that can be solved by the use of precision boring machines equipped with suitable holding fixtures.

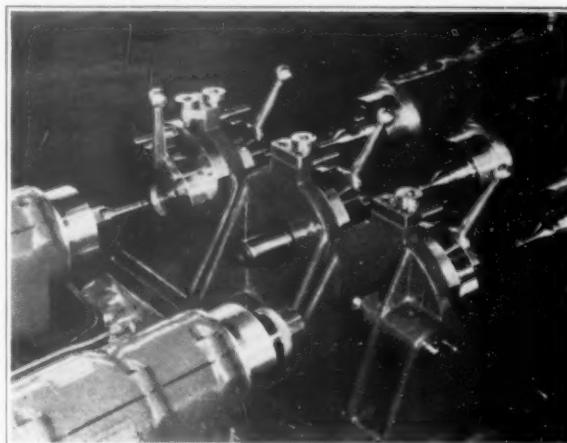
The production required on a particular part in a measure determines how extensively it can be tooled. On high production a complete machine can be devoted exclusively for the production of one part. In many cases the production is not so high but there are a variety of parts to be handled. It is this type of application that will be described.



Above is a view of the Ex-Cell-O Precision Boring Machine with boring units, but without holding fixture. On each application the same base mounting bridges and the required number of boring units are furnished. In this photo there are six boring units—however, this number can vary from one to twelve depending on the application. The machine is full hydraulic and through proper location of dogs shown on the side of the table, the operation cycle can be controlled. The machine proper is started and stopped by the round hand button in the center of the machine, just below the table control dogs.

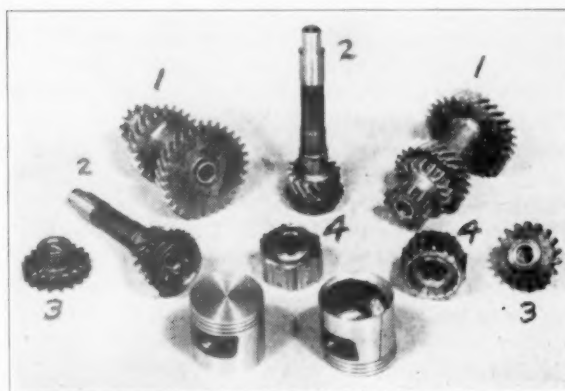
The boring units are individually mounted on the bridge, each having a self-contained driving motor. This eliminates vibration caused by belts, gears, coupling and other similar methods of driving the boring units. Precision ball bearings are used throughout the boring unit, permitting a definite control on radial end and thrust which is essential to obtain a fine, true finish.

Following is a close-up view of one side of a fixture that was designed to bore the parts in the last picture on this page. On one side of this fixture are located



three boring units and on the opposite side, two boring units. The fixture is so designed that four different parts are bored in one operation. The last unit at the back of the fixture is used for holding the cluster gear shown below. It is located by a three point cam acting chuck which locates and holds the part on the pitch diameters of the two end gears. The back boring unit on each side of the fixture is used for boring the bronze bushing in either end of the cluster gear. These two boring units are accurately aligned up with the chuck in the fixture so that each unit finish bores the bushing at that respective end with one loading.

The pinion gear shown at No. 2 is held in a unit in

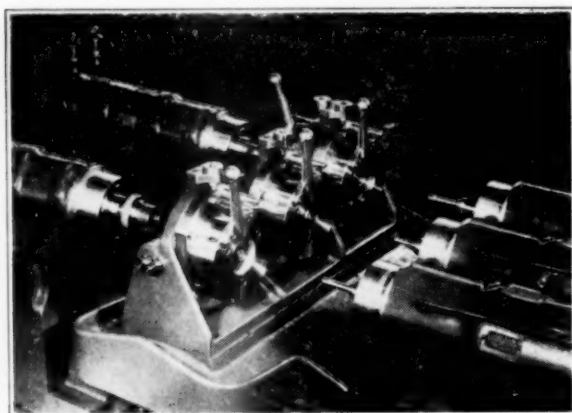


the center of the fixture. It is located with the small end bearing fitting into a bushing and located and held on the pitch diameter of the gear in the same type of chuck as used on the cluster gear. The endwise adjustment is made by locating against the back face of the gear which is necessary as the hole to be bored is blind.

The second speed gear No. 3 is located in the front unit of the fixture. It is located and held on the pitch diameter in the gear chuck and is squared against a ground surface at the back of the chuck.

A double end synchronizing cone is shown at No. 4. There are two views of each part shown to better illustrate the shape and part to be bored. Each of the parts just described is held rigidly in the fixture and the boring unit carries the diamond cutting tools. This part is held in a chuck mounted on the boring unit nose. The boring unit is then adjusted so that the required angle corresponding to the taper to be bored can be held between the part and the boring tool. The boring tool is mounted in a holder in the fixture on the opposite side from where the second speed gear is bored. This part has a conical bore at each end and the two cones are the same size and angle. The holding chuck is so constructed that the part is easily reversed for boring both ends. The part is located from the boring unit nose and against the ground end surface thereby controlling the diameter of the large end of the taper.

The gear chucks on the fixture proper have vertical micrometer adjustments and each boring unit horizontal adjustment on the mounting bridge. This permits an easy and fool-proof adjusting method for aligning the fixture and each boring unit.



The set-up of the various parts and the length of the boring quills was laid out in such relation to each other that it is possible to operate the machine producing two or three parts of the right combination at the same time. The holes to be bored in both the pinion gear and the synchronizing cones are blind which requires that the table moving the fixture to and from the boring units must be accurately stopped and reversed. This is accomplished by the proper location and use of the control dogs shown in Photo "A". For this reason these two parts are placed on opposite sides of the fixture which gives only one part with closely controlled stop at each end of the table travel. The other parts to be bored have open holes, permitting the boring tool to pass entirely through the section to be bored which gives a flexibility for working combinations.

The stock to be bored on each part is bronze and approximately .008 to .010 stock is removed on the diameter. The working limit held on each part is .0002. On the cluster gear the alignment of the two bushings is checked by a plug gauge .0002 under the hole size with the requirement that the plug must pass through both bearings freely. Diamond tools are mounted on all quills and the tool used for boring the cone faces of the synchronizing cones is tipped with cemented tungsten carbide. The tool proper being of special design for this application.

ANNOUNCEMENTS

The May meeting of the Detroit Section of the Society of Automotive Engineers will be at the Book Cadillac Ballroom, Monday May 9, 1932.

Dinner 6:30 Meeting 8:00 P. M.
C. F. Kettering, Vice President & Director of General Motors Corp. will speak on the subject "Engineers have lots to do".

Detroit Motor-boat and Sportsman's Show,
Convention Hall May 7-11.

S. A. E. 1932 SUMMER MEETING

The Greenbrier, White Sulphur Springs, W. Va.,
June 12, 13, 14, 15, 16 and 17, 1932.

"A three ringed circus of Technical Sessions, Committee Meetings and Recreational Events arranged so you can have a Ringside Seat at all Performances."

During the American Legion Convention an old lady, alarmed at the antics of the Legionnaires, rushed up to a policeman saying: "Can't you stop them, officer?"

"Lady," responded the cop sadly, "there's an old man in Europe who tried to do that, and now he's sawing wood in Holland."

LAUNCHED DRIVE TO LICK DEPRESSION

An intensive drive to shake off the lethargy of depression has been started in Detroit, during the week of May 4-5. There is being concentrated in the Hotel Statler various associations, institutes and other industrial organizations attending the M-M-M Congress.

Following the lead of the automotive industry, which first made sure that it had a good product at the right price and then threw its whole heart and soul into a strong advertising and selling campaign in an effort to stimulate sales and help restore business to normal level, the Materials Handling Institute and other associations are determined to see what can be done along the same line by industry as a whole.

The movement is not confined to the group of associations which is meeting in Detroit at the M-M-M Congress, but the time is set for the firing of the first gun. Copies of a resolution sent to SECRETARY OF COMMERCE LAMONT have been forwarded to the Illinois Manufacturers' Association, Pennsylvania Manufacturers' Association, New England Council, National Automobile Chamber of Commerce and other similar organizations throughout the nation. From many of these have come replies indicating their willingness to do their utmost in furthering the drive.

It is felt that whereas each individual concern must work out its own salvation the difficulties of doing this will be greatly ameliorated if industrial concerns all over the country can be induced to pull together.

(This initial feature on the "Strength of Material" is presented by John M. Christman, mathematician and author of mathematical text books. Peter F. Rossmann, author of mechanical articles collaborated with Mr. Christman in the preparation of the text. If there is evidence of sufficient interest, additional articles on the subject will appear in forthcoming issues.)

STRENGTH OF MATERIAL

In the design of jigs and fixtures, the thickness of a casting wall or the size of a hold down clamp is based on past practice or is entirely a matter of individual judgment. Fortunately in most cases, the margin of safety allowed is more than ample. However, economies in weight can be effected and chances of serious breakage eliminated by judiciously determining and applying the proper material strengths.

It is a well known fact that a great number of tool designers avoid calculating the strength of the materials used in their designs. The reason for this avoidance is not known. It is only natural when terms, such as "Elastic Limit", "Modulus of Elasticity", etc., are encountered in the essential computations. Explanations of equations are usually very technical and difficult to understand and grasp because the accompanying explanatory problems seldom involve the actual conditions encountered. The designer is bewildered and confused and becomes firmly convinced that the solution of the apparently mysterious calculations can only be determined by a master mathematician.

In reality it is all very easy to understand when the fundamentals are expressed and explained in simple terms involving practical applications.

The first to be considered will be the "Modulus of Elasticity". The reciprocal of this value, ie: 1 divided by the "Modulus of Elasticity" is the amount any substance 1 inch long with a cross-section area of 1 sq. inch will stretch or compress when subjected to a load of 1 pound. For example: The "Modulus of Elasticity" for steel as given in the tables is 29,000,000. This means that a piece of steel 1 inch long with a cross-section area of 1 sq. inch will stretch or compress $1/29,000,000$ or .000000034 when subjected to a load of 1 pound. If the piece of steel were 2 inches long instead of 1 inch or the load 2 pounds instead of 1 pound, the change in length would be 2 times as great; also if the cross-section area were 2 sq. inches instead of 1 sq. inch, or the load $1/2$ pound

instead of 1 pound, the change in length would be $1/2$ as great.

It follows that the change that takes place in any substance, of any length and cross-section area subjected to any load is proportional to the reciprocal of its "Modulus of Elasticity".

A second article featuring illustrations and practical problems further involving the "Modulus of Elasticity" will be presented in the next issue.

REPORT OF COMMITTEES

The Membership Committee under the leadership of W. H. Smila, chairman, reports as follows: The American Society of Tool Engineers was formed and Charter granted with a list of 286 Charter Members, including a 33 man Board of Directors.

This Membership is composed of Superintendents, Factory Managers, Master Mechanics, Tool Engineers, Tool Designers and Students in Tool Design and Tool Engineering. We are also proud to say that this membership list represents most of the principal plants and a good number of the smaller ones in Greater Detroit, including Pontiac, Michigan.

Since the organization of the Society, we have had inquiries for membership from Pittsburg, Roslyn and Erie, Penna.; Somers, Conn.; Grand Rapids, Ann Arbor and Lansing, Michigan; Columbus, Indiana; Mansfield and Cleveland, Ohio; Linden, N. J.; Rockford, Ill.; Berkeley, Calif., and other points throughout the country.

The membership committee is at present forming plans for a drive for new members, having set as a goal, a total membership of 1000 members for 1932.



EMBLEM COMMITTEE:

Fred L. Hoffman, Chairman

We have chosen emblem shown on cover as the insignia of the Society; adopting blue and gold as the official color for senior members and maroon and gold for junior members. Many designs were made and submitted, some of which showed tools or machine parts, and could not be used to represent a society whose members are employed in such diversified industries as we will soon be National in scope and do not want to discriminate against any industry.

DIES AND TOOLS IN BUILDING BRIGGS BODIES

By V. J. GRAF

Chief Die and Tool Engineer

Dies and tool are the basis of our industry. Without them, our schemes of production, our standards of living, our forms of transportation—in fact, the entire mode of twentieth century living could not be what it is. With this in mind it will be of interest to briefly illustrate and discuss the various steps of designing, building and producing production dies, which are so rarely accepted at their true intrinsic worth.

The Engineering Department, as a final climax of design, releases, detailed drawings of the outer panels, brackets, braces, reinforcements, etc., commonly termed "stampings," to the Die Design Department. These drawings, or part prints, are immediately stamped as received, dated and filed. Dear reader, this is mentioned as representing a great factor hidden to the average person, but being of great importance on the alibi sheet.

Immediately upon release of prints, and sometimes before the draft is completed, models are made. The eventual model is a perfect fac-simile of the desired product to be turned out by the tools in the form of steel stampings and is exact in dimensions within 1/64 of an inch, the surface being true to curves and contours—a true model, as perfect as human skill can make it.

Routing and Estimating

The term "routing" is applied to the laying out of operations on any one part for the necessary steps in making that part with tools by mass production methods. This, the most important step, is based on engineering skill backed by years of hard experience. The Estimating Department, composed of a group of men trained throughout the different phases of manufacturing and eventually recognized for their ability, are held beyond any doubt responsible for obtaining body contracts. Body stampings play one of the most important parts, in which tool cost to produce and operation cost to manufacture are the secret. Dollars counted in millions is the factor. The ability of this group aided by the Sales Department in matching experience with competitive body manufacturers constitutes a nucleus vital to the success of Briggs Manufacturing Company. When estimating, the various departments affected are

considered, for instance: Die Engineering which is held responsible for die and tool cost in connection with construction; likewise, stamping cost, because stamping operations reflect the cost above material. Hence when receiving prints, the routing, after being decided upon, is closely compared with the original estimate. A miss or error can be appreciated but not tolerated. As the saying goes, "A Doctor can bury his mistakes, but an Engineer's mistakes bury him."

Die and Tool Design

The stamping now being routed, gives the designer of tools the idea for conceiving in his imagination a tool that will perform that particular operation of the group that is necessary to produce the stamping in mass production. Here, again, draftsmen are required. These men are familiar with die design, being specialists trained to carry out and develop a thought on paper. A designer may work for days and weeks on one die for one operation before it is finally accepted. Each die is a machine in itself, termed a "die" because it is a type of tool for turning out parts of regular or irregular shapes in a press. When designing each die it is necessary to bear in mind the previous and the following operations to be performed in producing the part as any one stamping, depending on its character, may necessitate the building of from one to twenty dies. A greater number, however, is a rarity in automobile stampings.

(TO BE CONTINUED).

NO CHANGE IN TAPER STANDARDS

Technical Committee No. 3 A. S. M. E. for the Standardization of Machine Tapers, after considering all phases of the problem, has decided not to recommend any changes at present. It recognizes that the requirements for taper shanks of drills, and those for milling cutters and other tools are not the same and the committee is now considering later developments in sharp tapers with positive holding device for tools of this kind. The sharp taper of 3½ in. per ft. or 16 deg. 36 min. included angle and with a cam lock worked out by leading milling machine engineers, is to be studied by a sub-group of the committee. For milling cutters and similar tools, this seems to have decided advantages. It can also be used to drive either straight or taper shank drills by means of adapters and provides for a quick change of tool.

APPLICATION FOR MEMBERSHIP

Article II - of the Constitution.

Section 1. - Membership in this Society shall be classified into two groups, - (1) Senior, and (2) Junior. In order to be admitted to Senior Membership, the applicant shall be either, (a) Tool Engineer, who is a man of recognized ability, to plan the order of operations, to layout, supervise the design and manufacture of tools and equipment; or (b) Tool, Die or Machine Designers having five years experience; or (c) an Executive possessing knowledge of tool engineering for mass production. Before a person may become a Senior Member, he must have attained the age of twenty-five years.

Section 2. - Any tool designer having less than five years experience or any student in a recognized school or college studying tool designing or tool engineering is eligible for Junior Membership.

FORMALITIES TOWARD MEMBERSHIP

BL-1. — All applicants for Senior or Junior Membership must set forth in the application for membership signatures of at least five members of the Society or if unable to obtain the signa-

tures of members he may give as reference the names of non-members familiar with his work. The applicant shall set forth in the application, a complete resume of his qualifications for membership.

BL-2. — The Board of Directors may in its discretion authorize the organization of enrolled students of the Society as Student Branches at recognized institutions of tool engineering, for purposes which are in harmony with the object of the Society; such branches shall be governed by such rules and regulations as prescribed by the Directors from time to time.

If qualified and interested in joining the American Society of Tool Engineers, fill out this coupon and forward to the Secretary's office, 8316 Woodward Ave., Detroit, Mich.

Please forward to me the standard application blank of the Society so that I may make application for membership.

NAME

ADDRESS

EDITORIAL



(Continued from Page 10)

Do we realize the tremendously important part the tool engineer has played in the development of our present high production methods? Tools make high production possible. Tools have been largely responsible and have made it possible for this nation to lead the world in mass production. Our recent era of prosperity was possibly due to our ability to produce in volume manufacturing. All of the nations of the World look up to us and study our production methods.

The ability of the tool engineer to originate, devise and create new methods has moved us along at a very rapid rate of progress. Who can visualize what will take place in the next ten years. We are at present in a low state financially and industrially, but we are improving our methods of manufacture. Is the tool engineer to be the one to jog this nation out of the present rut by developing new and startling methods of

manufacture, making possible such reductions in costs that sales can mount during this period of low buying power? Who knows?

F. R. L.

* * *

A few words about advertising—The American Society of Tool Engineers is organized as a non-profit corporation and the dues are fixed at a low figure. The low dues do not permit the publication of the journal without outside aid, therefore, it is necessary to permit a certain amount of paid advertising in the Journal. According to our charter, this Society is not allowed to make a profit, therefore, the amount of advertising will be restricted to that amount necessary to defray the balance of the cost of publication.

It is not our intention to discriminate against anyone in the matter of advertising in this Journal but acceptable copy must be presented and it will be used in its proper turn in future issues.

—The Publicity Committee Editors.

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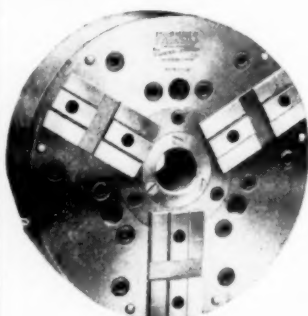
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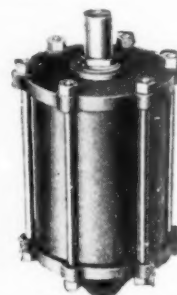
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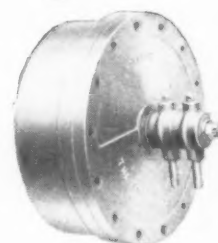
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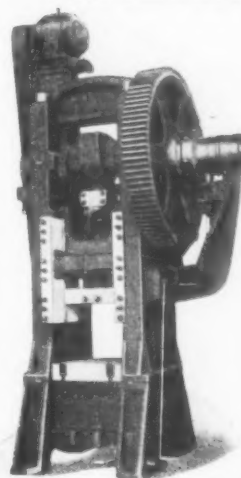
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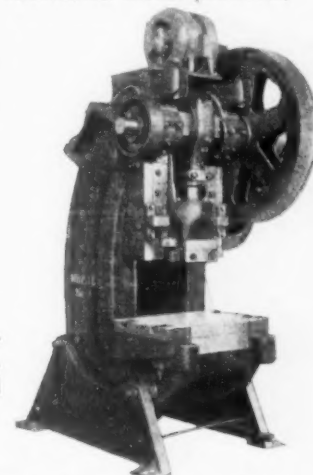
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After quenching in water do not draw back, tool is ready to be put to work.

"Magic" Steel welds readily and has not the tendency to watercheck.

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Detroit, Michigan

MANUFACTURERS of "Q-C" PRODUCTS

Phones: Cadillac 3419-3420.